

Using fiction to help students form opinions about the applications of science to society

Authors:

Knippels, Marie-Christine; Erasmus University Rotterdam
Severiens, Sabine; Erasmus University Rotterdam
Klop, Tanja; Erasmus University Rotterdam

Publisher:

International Journal of Science Education, vol. 31, no. 15, October 2009, pp.2057-2083

[Original title: Education through fiction: Developing opinion-forming skills in the context of genomics]

Does fiction help students develop their opinions?

Identifying a moral or social issue and developing and presenting an argument is an important skill that learners are expected to develop in different areas of the curriculum in England. It is, for example, a key part of scientific literacy which enables students to form judgements about the science-based issues which affect their lives.

This study from the Netherlands aimed to test whether fictional film can help students to develop skills in opinion-forming with regard to issues that impact on our day-to-day lives. The particular focus for this study was learning debate issues related to human genetics, such as Huntington’s disease, cystic fibrosis, use of stem cells, and therapeutic cloning. The approach described in the study was found to be effective in encouraging year 11 students to develop better strategies for achieving more balanced and better founded opinions and to provide more arguments when explaining their position. Specifically the study findings showed that using clips from fiction films was more effective than using factual news reports, and students involved in both these approaches made greater improvements than a control group of students.

Keywords:

the Netherlands; Key Stage 4; students; science; motivation; communication; thinking skills

Contents

Does fiction help students develop their opinions?	1
What effects did using fictional film have on students’ opinion-forming skills?	2
How did teachers help students learn to form a well-grounded opinion?.....	2
What lessons did the researchers and teacher learn during a pilot study of the intervention?	3

How was the research carried out?	4
What are the implications?.....	4
Where can I find out more?	5

What effects did using fictional film have on students’ opinion-forming skills?

In the study teachers used two approaches to develop students’ skills in forming and justifying their opinions with two groups of students. The first involved the use of fictional film and the second was based on factual news reports. The study findings showed a number of benefits:

- Both groups of students showed more awareness of opinion-forming skills than those in the control group, who followed the normal approach in class
- Students in the film and news report groups used more reasoning steps in reaching their opinion than the control group students
- Students in the film and news report groups used more arguments in reaching their opinion. For the group who watched the film this was a particularly strong outcome
- Students who had explored the issues via fiction film and news reports acquired more skills in forming opinions than those students who followed their usual lessons. The materials used for the film group seemed to stimulate students to develop a more informed opinion, taking more steps in doing so and using more arguments. Neither of the new approaches seemed to help students identify the moral issue more successfully than before. The researchers speculated this might be because they had already reached an adequate level of performance in this area.

How did teachers help students learn to form a well-grounded opinion?

Teachers structured their lessons around five key areas which were already part of the Dutch curriculum:

- Exploration - recognising and extracting a moral question from the situation or dilemma
- Explication - becoming aware of arguments, values and actions the learner and others apply in life, identifying what information they need and what is missing
- Analysing - identifying who is involved in the moral dilemma, knowing which arguments are relevant in reaching an opinion, being able to think through the consequences of various decisions on the people involved
- Weighing - examining different arguments and perspectives and weighing them against each other to reach a judgement
- Approach - deciding what concrete course of action would follow from their decision.

Teachers and researchers planned a series of four lessons which involved students in activities designed to develop the skills students needed in these five areas. They involved their students in individual, small group and whole class discussion and reflection. Different lesson activities were used to provide a context for, and to focus, on particular skills. For example, in order to help students explore an issue and identify the information they needed, the teachers presented students with the following activities:

- Watching a 10-minute clip from the film *Gattaca*, or from a news report on donor babies. The clips were selected because they both covered the issue of embryo selection for perceived desirable traits
- A class exploration of questions to help students place what they saw in context and to help the teacher ensure students understood what the clip was about
- Students writing down an initial opinion individually then sharing and reflecting on each others' opinions in small groups
- A class discussion of their initial ideas and opinions during which students identified further scientific information they needed such as "Is everything seen possible?" "How do these techniques work?"

Other lessons built on and developed the work from earlier lessons. After identifying knowledge needed to explore the dilemma, students collected and interchanged information and then reconsidered the issue. In another lesson students focused on formulating moral questions from the information given, looking at pro and con arguments, and looking at consequences for the child/embryo, parents, medical staff and others involved in the issue. The final lesson gave students the opportunity to reflect on what they had learned and to use the skills they had acquired to tackle a new question in small groups before developing their responses in more detail individually.

What lessons did the researchers and teacher learn during a pilot study of the intervention?

Teachers were closely involved in the design of the module and participated in a pilot study. As a result of comments made by the teachers a number of key issues came to light:

- Science teachers felt they lacked the skills and confidence to handle controversial issues in the classroom
- Students needed support to encourage collaboration
- Students needed teachers help regarding keeping discussion focused
- There was a danger of overload if too many dilemmas were presented to students.

In order to help teachers implement the intervention the researchers wrote a detailed teachers' manual based on their discussions with teachers about their experiences. The manual covered lesson plans, background information, learning activities and learning goals. To help teachers overcome their fears

about how to handle sensitive and controversial issues in the classroom, researchers put on a workshop on ethics and how to facilitate discussion about ethical issues.

In relation to fostering collaboration the teachers suggested that, rather than students independently looking up relevant scientific ideas, they should work together using a jigsaw method. This would involve each student bringing some information to a group which then shared and assembled the information in a way which helped the students tackle the problem.

Similarly teachers thought it would be useful to provide students with a worksheet on which they could keep notes of the arguments used during discussion about the dilemma. They believed this would enable the teacher and the students to keep better track of the discussion.

Teachers suggested that there should be a gap of a few weeks between the third and the fourth lessons, when a new issue was introduced. Teachers believed this helped to avoid overload and also gave students and teachers the opportunity to find out what the students could remember and apply after a time interval.

How was the research carried out?

The study aimed to test whether film fiction could help students develop opinions with regard to issues raised by human genetics. It involved 11 biology classes of 16-year-old students from three schools in the Netherlands and followed a teaching unit on heredity and DNA. The classes were assigned to one of three conditions:

- Group 1 - use of fictional film clips
- Group 2 - use of news report clips
- Group 3 - control students following normal lessons.

Students completed tests before and after the series of lessons to establish how much progress they had made. In total 266 students were involved.

The tests involved questions about the issue of how best parents and the medical profession should respond to the possibility of Huntington's disease occurring in a family. The questions covered what steps students thought they needed to use, how many steps students recorded in developing their opinion, the validity of the steps they used and how they used them to come to a conclusion.

What are the implications?

In completing this digest the authors began to ask the following questions about implications for practitioners:

- The use of fictional film appeared to stimulate students' skills in forming opinions. Are there parts of your subject area for which you and your students can find relevant excerpts from films, television programmes etc? To build up your repertoire of film resources, you could set up a

competition, awarding points to students who find links between story lines in the films and programmes they watch and the curriculum they are covering at school

- Teachers in the study did not simply show films, they structured learning activities around them to develop learners' skills. You might find it helpful to share the way you structure activities around the use of video with department colleagues as a starting point for identifying and developing effective practice in this area.

In addition the authors began to ask the following questions about implications for school leaders:

- The use of fictional film appeared to provide an effective context for developing students' skills in thinking through and forming opinions about socio-ethical issues related to science. Are there opportunities for teachers from different subject areas to collaborate in developing video resources and activities which link learning across the curriculum? An English focus might be on language and genre, for example, a drama focus on acting; a history or science focus on discovery and evidence, etc.
- Some teachers in the study were not comfortable with teaching about issues involving moral dilemmas. How might you support teachers who are planning to engage with these issues? Does the approach to CPD described in the study offer any ideas for developing your teachers' skills in this area?
- The study also implies that it is important for teachers to select learning resources, such as films and news reports, that cover the intended learning content as well as providing a context for a discussion about an ethical issue. Are there ways you can deploy support staff so there are more systematic ways of identifying relevant video and other resources to support learning? You might arrange for support staff such as the librarian to sit in on department meetings to keep up-to-date with developments in the curriculum, for example, or even make arrangements with the local library service.

Where can I find out more?

How can student talk contribute to critical thinking and reasoning skills in science and citizenship?

<http://www.standards.dfes.gov.uk/research/themes/thinkingskills/studenttalk/>

How can teachers help children to use evidence when making decisions?

<http://www.standards.dfes.gov.uk/research/themes/thinkingskills/decisions/>

Philosophy for Children: deepening learning for 10 to 12 year old pupils

<http://www.standards.dfes.gov.uk/research/themes/thinkingskills/philosophy/>

The Nuffield Citizenship website provides ideas and resources for citizenship across the curriculum, including science at: www.citizenship.org.uk/

DNA database activity

<http://www.glasgowsciencecentre.org/dnadatabases.aspx>